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2004/00080

10 SEP 2004

Certificate

REPUBLIC OF SOUTH AFRICA

PATENT OFFICE
DEPARTMENT OF TRADE AND
INDUSTRY

2004/00080

10 SEP 2004

REC'D 16 SEP 2004

WIPO

PCT

the documents annexed hereto are true copies of:

Application forms P.1, P2, provisional specification and drawing of South African Patent Application No. 2003/5444 as originally filed in the Republic of South Africa on 15 July 2003 in the name of DETNET SOLUTIONS (PTY) LTD and an applicant substituted to DETNET SOUTH AFRICA (PTY) LTD on 01 July 2004 for an invention entitled: "BLASTING SYSTEM AND PROGRAMMING OF DETONATORS."

Geteken te

PRETORIA

in die Republiek van Suid-Afrika, hierdie

in the Republic of South Africa, this

26th

dag van

day of

July 2004

**PRIORITY
DOCUMENT**
SUBMITTED OR TRANSMITTED IN
COMPLIANCE WITH RULE 17.1(a) OR (b)

Registrar of Patents

REPUBLIC OF SOUTH AFRICA				PATENTS ACT, 1978			
REGISTRAR OF PATENTS							
Official Application No.				Lodging date: Provisional		Acceptance date:	
21	01	200375444		22	15 July 2003		47
International classification				Lodging date: Complete		Granted date:	
51				23			
Full name(s) of applicant(s)/Patentee(s)							
71	DETNET SOLUTIONS (PTY) LTD						
Applicant(s) substituted:				AANSOEKERS VERVANG AANSOEKERS SUBSTITUTED		Date Registered:	
71	DETNET SOUTH AFRICA (PTY) LTD					01.07.02	
Assignee(s):				Date Registered:			
71							
Full name(s) of inventor(s)							
72	KOEKEMOER, Andre Louis and LABUSCHAGNE, Albertus Abraham						
Priority claimed		Country		Number		Date	
Note:		33	NONE	31	NONE	32	NONE
Use International		33		31		32	
Abbreviation for Country		33		31		32	
Title of Invention:							
54	BLASTING SYSTEM AND PROGRAMMING OF DETONATORS						
Address of applicant(s)/patentee(s)							
AECI Place, The Woodlands, Woodlands Drive, Woodmeand, Sandton							
Address for Service:							
74	McCALLUM, RADEMEYER & FREIMOND, Maclyn House, 7 June Avenue, Bordeaux, Randburg • P.O. Box 1130, Randburg 2125						
Patent of Addition to Patent No.:				Date of any change:			
61							
Fresh Application based on:				Date of any change:			

McCALLUM, RADEMEYER & FREIMOND
Ref. P.19955

REPUBLIC OF SOUTH AFRICA
PATENTS ACT, 1978



APPLICATION FOR A PATENT AND ACKNOWLEDGEMENT OF RECEIPT

(Section 30(1) – Regulation 22)

The grant of a patent is hereby requested by the undermentioned applicant on the basis of the present application filed in duplicate

Revenue Stamps or Revenue Franking
Machine Impression

OFFICIAL APPLICATION NO.

21 01 20 03 / 54 44

OFFICIAL DATE STAMP

FULL NAME(S) OF APPLICANT(S)

71

DETNET SOLUTIONS (PTY) LTD

ADDRESS(ES) OF APPLICANT(S)

AECI Place, The Woodlands, Woodlands Drive, Woodmeand, Sandton

TITLE OF INVENTION

54

BLASTING SYSTEM AND PROGRAMMING OF DETONATORS

Priority is claimed as set out on the accompanying Form P2.

The earliest priority claimed is: NONE

This application is a patent of addition to Patent Application No.

21

01

This application is a fresh application in terms of section 37 and based on Application No.

21

01

THIS APPLICATION IS ACCOMPANIED BY:

- ☒ 1 A single copy of a provisional specification of ...7... pages
- ☐ 2 Two copies of a complete specification of pages
- ☒ 3 ...1... Sheets of Informal Drawings
- ☐ 4 Sheets of Formal Drawings
- ☐ 5 Publication particulars and abstract (Form P8 in duplicate)
- ☐ 6 A copy of Figure of drawings (if any) for the abstract
- ☐ 7 Assignment of Invention
- ☐ 8 Certified priority document(s) Number(s)
- ☐ 9 Translation of priority document(s)
- ☐ 10 An assignment of priority rights
- ☐ 11 A copy of the Form P2 and the specification of SA Patent Application
- ☐ 12 A declaration and power of attorney on Form P3
- ☐ 13 Request for ante-dating on Form P4
- ☐ 14 Request for classification on Form P9
- ☒ 15 Form P2 in duplicate



74 ADDRESS FOR SERVICE: McCALLUM, RADEMEYER & FREIMOND, Madyn House, June Avenue, Bordeaux
P.O. Box 1130, Randburg, 2125

Dated 15 July 2003

Received – Official Date Stamp

REGISTRAR OF PATENTS

McCALLUM, RADEMEYER & FREIMOND
PATENT AGENTS FOR APPLICANT(S)

REPUBLIC OF SOUTH AFRICA
PATENTS ACT, 1978

PROVISIONAL SPECIFICATION

(Section 30(1) – Regulation 27)

OFFICIAL APPLICATION NO

21	01	2003/5444
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LODGING DATE

22	15 July 2003
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FULL NAME(S) OF APPLICANT(S)

71	DETNET SOLUTIONS (PTY) LTD
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FULL NAME(S) OF INVENTOR(S)

72	KOEKEMOER, Andre Louis and LABUSCHAGNE, Albertus Abraham
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TITLE OF INVENTION

54	BLASTING SYSTEM AND PROGRAMMING OF DETONATORS
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BACKGROUND OF THE INVENTION

5 [0001] This invention relates generally to a blasting system and more particularly is concerned with the programming of each of a plurality of electronic delay detonators, to be used in a sequential blasting operation, with blast timing signals.

SUMMARY OF INVENTION

10 [0002] The invention provides, in the first instance, a method of programming a plurality of detonators which are connectable in sequence to a communications bus, the method including the steps of using a first detonator in the sequence to enable a second detonator which follows the first detonator, disconnecting the first detonator from the communications bus, connecting the second detonator to the communications bus, using the communications bus to exchange at least programming data between a control unit and the second detonator, and using the second detonator to enable a third detonator which follows the second detonator in the detonator sequence.

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[0003] The aforementioned method can be carried out for each of the detonators in the sequence.

20 [0004] In order for a detonator in the sequence to enable a following detonator, the invention provides that the detonators are preferably connected to each other using a daisy chain system.

5 [0005] The invention also extends to a method of programming a plurality of detonators in sequence which includes the steps of using a first detonator to enable a second detonator, programming the second detonator using a communications bus to which all of the detonators are connected in parallel, using the second detonator to enable a third detonator, and using the communications bus to disable the second detonator.

10 [0006] The invention also provides a blasting system which includes a control unit, a communications bus which is connected to the control unit, a plurality of individually programmable detonators which are connected in sequence to the communications bus along its length, and a daisy chain connection between the control unit and the detonators, and wherein, within the sequence of detonators, a first detonator makes use of the daisy chain connection to enable a second following detonator so that data can be exchanged between the control unit and the second detonator using the
15 communications bus.

BRIEF DESCRIPTION OF THE DRAWING

20 [0007] The invention is further described by way of example with reference to the accompanying drawing which illustrates a blasting system according to the invention.

DESCRIPTION OF PREFERRED EMBODIMENT

[0008] The accompanying drawing illustrates a blasting system 10 according to the invention.

[0009] The blasting system includes a control unit 12 to which is connected a communications bus 14 and a daisy chain system 16. The control unit has terminals 18A and 18B to which the lines of the communications bus are connected, and terminals 18C and 18D to which a daisy chain line 24 and a return line 26 are connected.

[0010] A plurality of individually programmable electronic delay detonators 30 are included in the system. The detonators are individually designated 30A, 30B, 30C 30N. The number of detonators in the sequence and their specific nature are determined according to requirement. These aspects are not further described for generally they are known in the art. Each detonator has respective terminals A, B, C and D.

[0011] Each detonator 30 is connected in parallel to the communications bus 14 via the terminals A and B, and, within the daisy chain system, the detonators are essentially connected in series via the line 24 and the terminals C and D.

[0012] The detonator sequence terminates in a device 32 which is connected to the daisy chain line 24 and the return line 26.

[0013] In practice each detonator 30 is positioned in a blast hole adjacent the explosive material using techniques which are known in the art. The control unit 12 is used for programming the individual detonators with timing information which ensures that the detonators initiate the respective explosive charges at precisely determined intervals to obtain a desired blasting pattern.

[0014] In the system of the invention, in order to program each detonator individually, it is necessary to control access to the detonators on a case-by-case basis. Initially the output 18D on the control unit and the terminals D on the respective detonators are in an inactive or default state and no detonator will respond to information on the communications bus 14.

[0015] The control unit 12 is used to activate the terminal 18D and a signal is sent to terminal C on the detonator 30A to enable the detonator. The control unit 12 thereafter sends a "connect daisy" command on the communications bus 14 and, as the detonator 30A has been enabled, the detonator responds to the connect daisy command and is thereby connected, for communication purposes, to the control unit via the communications bus 14. The remaining detonators in the sequence, during this process, are not enabled and hence remain inactive.

[0016] The detonator 30A can then be programmed directly from the control unit. The identity of the detonator 30A is recorded by the control unit and relevant timing information, which has previously been determined, is transferred from the control unit to the detonator 30A to program the detonator according to requirement.

[0017] After the transaction between the control unit and the detonator 30A has been completed the control unit instructs the detonator 30A, via the communications bus, to activate its terminal D. When this happens an enabling signal is transmitted by the detonator 30A to the terminal C on the detonator 30B. The controller 12 then sends a disconnect command along the communications bus and the detonator 30A is disconnected from the bus. Thereafter the controller sends a connect daisy command on the communications bus which is received by the detonator 30B and, in a process similar to what has been described, the detonator 30B can then be programmed according to requirement.

[0018] The aforementioned process is repeated along the detonator chain with each detonator enabling a following detonator in the sequence so that the following detonator can be programmed by the control unit. As noted once a detonator has been programmed and after it has enabled a following detonator it is effectively disabled by a signal from the control unit sent via the communications bus.

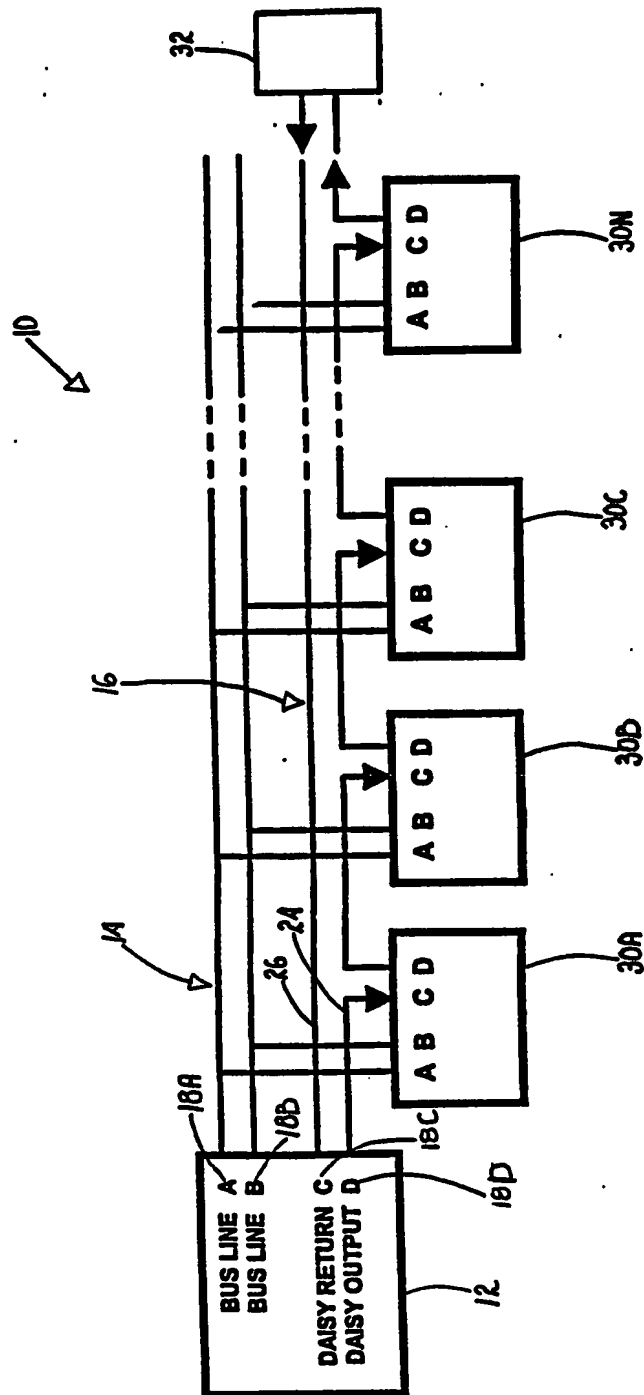
[0019] Once the last detonator 30N in the sequence has been programmed a signal output from its terminal D is received by the termination device 32 and is returned via the return line 26 to the control unit. This allows the control unit to determine that the sequence of transactions has reached the end of the installation.

[0020] The blasting system of the invention allows the identity of each detonator to be recorded in the control unit and for a predetermined time

delay to be assigned to each of the detonators. If required, and depending on the installation conditions, the time delay between successive detonators in the sequence can be automatically implemented. Once the programming sequence has been initiated it is carried out without human intervention and this reduces the likelihood of human error occurring.

Dated this 15th day of July 2003.


McCALLUM, RADEMEYER & FREIMOND
Patent Agents for the Applicant



McCallum, Rademeyer & Freimond